

FAILURE MODES EFFECTS ANALYSIS (FMEA) -- CIL HARDWARE

NUMBER: 05-6J-2035 -X

SUBSYSTEM NAME: EPD&C - MAIN PROPULSION SYSTEM

REVISION: 1 07/27/00

PART DATA

PART NAME	PART NUMBER
VENDOR NAME	VENDOR NUMBER
SRU : PANEL R2	ME452-0102-7352, -8352
SRU : SWITCH, TOGGLE	V070-730277

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

SWITCH, TOGGLE (3 POLES, 2 POSITIONS, LEVER LOCKED), GH2 FLOW CONTROL VALVES (LV56, 57 58).

REFERENCE DESIGNATORS: 32V73A2S53

QUANTITY OF LIKE ITEMS: 1

FUNCTION:

PROVIDES MANUAL CONTROL OF GH2 FLOW CONTROL VALVE CLOSE SOLENOID INHIBIT.

FAILURE MODES EFFECTS ANALYSIS FMEA -- CIL FAILURE MODE

NUMBER: 05-6J-2035-02

REVISION#: 2 07/27/00

SUBSYSTEM NAME: EPD&C - MAIN PROPULSION SYSTEM

LRU: PANEL R2

CRITICALITY OF THIS

ITEM NAME: GH2 FLOW CONTROL VLV CL SW (LV56, 57, 58)

FAILURE MODE: 1/1

FAILURE MODE:

CONTACT-TO-CONTACT SHORT ("OPEN" CONTACTS).

MISSION PHASE: LO LIFT-OFF

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

CAUSE:

PIECE PART STRUCTURAL FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) N/A
	B) N/A
	C) N/A

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

POSSIBLE LOSS OF CREW/VEHICLE FOR ME452-0102-7352, SWITCH CONFIGURATION ONLY. SINGLE POLE BREAKS LIBERATING THE ROLLER/SPRING. THE ROLLER AND SPRING BRIDGE TWO SETS OF OPEN CONTACTS PROVIDING INHIBIT SIGNALS TO TWO SEPARATE FLOW CONTROL VALVE SERIES HDC III PAIRS. INADVERTENT DEACTUATION OF TWO FLOW CONTROL VALVE SOLENOIDS.

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RESULTS IN EXCESSIVE GH2 ULLAGE PRESSURE CAUSING ET VENT VALVE TO RELIEVE EXCESS PRESSURE. POTENTIAL FIRE/EXPLOSION HAZARD EXTERIOR TO THE VEHICLE. POSSIBLE VIOLATION OF THE ET MAXIMUM STRUCTURAL CAPABILITY REQUIREMENTS.

(B) INTERFACING SUBSYSTEM(S):

SAME AS A. THE GH2 FCVS WILL OPEN/REMAIN OPEN.

FOR GH2 SYSTEM, FCV CLOSE COMMANDS ARE VERIFIED ON BY LCC FROM PRE PRESSURIZATION TO T-31 SECONDS.

(C) MISSION:

SAME AS A. POSSIBLE LAUNCH SCRUB DUE TO LCC VIOLATION.

FOR RTLS AND TAL ABORTS, POSSIBLE LOSS OF CREW/VEHICLE.

(D) CREW, VEHICLE, AND ELEMENT(S):

SAME AS C.

(E) FUNCTIONAL CRITICALITY EFFECTS:

FOR THE ME452-0102-8352, LOW CURRENT SWITCH CONFIGURATION THE SWITCH POLES ARE COMPARTMENTALIZED AND A SINGLE POLE FAILURE CANNOT MIGRATE TO ANOTHER POLE.

1R/2, 2 SUCCESS PATHS. TIME FRAME - ENGINE OPERATION.

- 1) CONTACT TO CONTACT SHORT ("OPEN" CONTACTS - ONE POLE)
CAUSING ONE GH2 FCV TO OPEN/REMAIN OPEN.
- 2) ONE OF THE FOLLOWING FAILURES ON A PARALLEL GH2 PRESSURIZATION LEG
CAUSING INADVERTENT DEACTUATION OF A SECOND GH2 FLOW CONTROL VALVE
CLOSE SOLENOID RESULTING IN A SECOND GH2 FCV TO OPEN/REMAIN OPEN:
 - CONTACT TO CONTACT SHORT ("OPEN" CONTACTS - ONE POLE)
 - FCV CLOSE COMMAND HYBRID DRIVER FAILS TO CONDUCT
 - ET ULLAGE PRESSURE TRANSDUCER FAILURE
 - LOSS OF A SIGNAL CONDITIONER
 - FCV FAILS IN THE HIGH FLOW POSITION

RESULTS IN EXCESSIVE GH2 ULLAGE PRESSURE CAUSING ET VENT VALVE TO RELIEVE EXCESS PRESSURE. POTENTIAL FIRE/EXPLOSION HAZARD EXTERIOR TO THE VEHICLE. POSSIBLE VIOLATION OF THE ET MAXIMUM STRUCTURAL CAPABILITY REQUIREMENTS.

POSSIBLE LOSS OF CREW/VEHICLE.

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-DISPOSITION RATIONALE-

(A) DESIGN:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(B) TEST:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

GROUND TURNAROUND TEST

ANY TURNAROUND CHECKOUT TESTING IS ACCOMPLISHED IN ACCORDANCE WITH OMRSD.

(C) INSPECTION:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

(D) FAILURE HISTORY:

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH.

CURRENT DATA ON TEST FAILURES, FLIGHT FAILURES, UNEXPLAINED ANOMALIES, AND OTHER FAILURES EXPERIENCED DURING GROUND PROCESSING ACTIVITY CAN BE FOUND IN THE PRACA DATABASE.

(E) OPERATIONAL USE:

NO CREW ACTION CAN BE TAKEN.

- APPROVALS -

S&R ENGINEERING	: W.P. MUSTY	:/S/ W.P. MUSTY
S&R ENGINEERING ITM	: P. A. STENGER-NGUYEN	:/S/ P.A. STENGER-NGUYEN
DESIGN ENGINEERING	: ANDY RIZVI	:/S/ ANDY RIZVI
MPS SUBSYSTEM MGR.	: TIM REITH	:/S/ TIM REITH
EPD&C SUBSYSTEM MGR.	: RICHARD PHAN	:/S/ RICHARD PHAN
MOD	: JEFF MUSLER	:/S/ JEFF MUSLER
USA SAM	: MICHAEL SNYDER	:/S/ MICHAEL SNYDER
USA ORBITER ELEMENT	: SUZANNE LITTLE	:/S/ SUZANNE LITTLE
NASA SR&QA	: BILL PRINCE	:/S/ BILL PRINCE